

# FOREIGN RESOURCES, DOMESTIC SAVINGS AND ECONOMIC GROWTH: THE CASE OF CENTRAL AMERICA\*

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## 1. Introduction

The external debt problems experienced by several Latin American countries during the past decade calls for an examination of the role that external resources play in the development process. The experience of the eighties showed increasing debt build up accompanied by stagnation, an outcome that was not considered by the "gap models"<sup>1</sup>. In effect, the traditional literature presents external resources as an input to economic growth as they relieve the binding foreign exchange or savings gaps. This literature has been challenged by other positions that maintain that external funds reduce domestic savings and hence economic growth. More recent studies have analyzed the debt overhang as well as the benefits and costs of debt relief mechanisms (Husain and Diwan, 1989; Berthelemy and Vourc'h, 1994). Moreover considerable attention has been directed to the consequences of the debt crisis (Cohen, 1993; Williamson, 1991). All this new research notwithstanding, it is necessary to take again the original preoccupation about the role played by external resources. Specially since several countries of the region still experience formidable constraints to mobilize domestic savings, so that their investment continues to be financed in large part with external resources. Thus, debt crises may have a recurrent nature.

This paper examines the role of external resources in the economic growth of four of the Central American countries: Guatemala, El Salvador, Honduras and Costa Rica. Data for Nicaragua was not available. In these countries, in the 1950-1970 period external resources were taking an increasing role in the financing of investment, which led to concurrent external debt problems in the early eighties. All countries incurred in arrears in their debt service and had to renegotiate their official bilateral and private debts. In the present decade, after economic adjustment and restructuring, external accounts are much more manageable and per capita economic growth has resumed. The experiences of the past decades point out the need to increase the mobilization of savings and lessen the dependence on external resources; moreover, it is important to discern the role that said resources exert on the growth process. To this end, a translog function with domestic and external savings as production factors will be estimated. This will be followed by an analysis of the results; finally, the paper will present a series of conclusions.

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1. For a review of the gap models see Taylor (1994).

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## 2. External Resources and Economic Growth

A partial review of the literature is presented next; very complete reviews have been published recently.<sup>2</sup> One of the most cited studies on external resources and growth is Papanek's (1973) analysis of a cross sectional sample of developing countries. He used average annual values of the 1950-1970 period and regressed real economic growth on domestic savings, foreign investment and aid. The results indicated that both external and domestic resources had significant positive impacts on economic growth.

Permazoglu (1972) studied the relationship between economic growth and the rate of growth of investment, and domestic and external savings ratios for a group of developing countries in the 1955-1966 period. His results showed that all the explanatory variables exerted a positive impact on economic growth.

Mosley (1980) analyzed the role played by domestic savings, concessional and other aid on economic growth. He used data corresponding to the mean values of the 1970-1977 period for a sample of 83 developing countries. The estimated equation showed that the coefficients of both forms of aid had no statistical significance.

Dowling and Hiemenz (1983) analyzed, for a sample of Asian developing countries, the impact on economic growth derived from domestic savings, official aid, and private capital inflows. The estimation by OLS regression methods of a cross section equation with data from the mid 70's, yielded positive and significant coefficients. However, when the equation was estimated by Two Stage Least Squares, the coefficients of the external aid variables became negative and insignificant.

Rana (1987) estimated an equation explaining the economic growth of a sample of Asian developing countries for the 1965-1982 period, as a function of exports, foreign investment and foreign aid. His results indicated that aid exerts an insignificant effect on economic growth, whereas the effect generated by foreign investment is considerable and much larger than that of exports.

Another study that found negative impacts of aid on growth is that of Voivodas (1973), while Singh (1985) found that when a variable representing the degree of state intervention in the economy was introduced in the growth equation, foreign aid had no statistical significance. Stoneman (1975), Mbaku (1993) and Tsai (1994) reported results showing that foreign investment exerts no impact on economic growth. A recent study by

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2. For a review of the literature on the impact of foreign resources on growth, see Cáceres (1992), White (1992), and White and Luttik (1994).

Borensztein et.al. (1994) reported that the impact of foreign investment on economic growth depends on the level of human capital of the recipient country, and in countries with low levels of human capital the effect is negative.

The review presented above indicates that the role played by external resources is still debatable. These studies have employed ad-hoc functional relationships between growth and external resources which may introduce a bias to the analysis. Moreover, many studies are of a cross-sectional nature which makes their interpretation difficult.

### 3. The Model and its Estimation

The model seeks to express economic growth as a function of external and internal resources. This requires to express GDP as a function of the stocks of domestic and foreign resources. However, since data on the stocks of domestic and external capital are not available, GDP is expressed as a function of investment and time, this latter variable denoting technical change:

$$y = f(I; t) \quad (1)$$

where:

Y= Gross domestic product

I= Investment, public and private

t= Time, a proxy for technical change

Since investment is equal to the sum of domestic and external savings, S and F respectively, expression (1) can be written as:

$$y = f(S, F; t) \quad (2)$$

A translog function is used to model expression (2), so as to take into account the substitution or complementarity relationships between S and F (Christensen et.al., 1973). The translog function is a generalized Cobb-Dougllass production function with varying elasticity of substitution and provides a convenient approximation to any production frontier.<sup>3</sup> Thus, expression (2) can be written as:

3. For recent applications of the translog function on growth analysis, see Baffes and Shah (1993) and Kim and Lau (1994).

$$\ln Y = a_0 + a_1 \ln S + a_2 \ln F + a_3 \ln S \ln F + \frac{a_4}{2} (\ln S)^2 + \frac{a_5}{2} (\ln F)^2 + a_6 t \quad (3)$$

This formulation becomes identical to a Cobb Douglas production function if  $a_3 = a_4 = a_5 = 0$  holds.

From (3) the elasticity of GDP growth with respect to S and F can be found:

$$\frac{\partial \ln Y}{\partial \ln S} = a_1 + a_3 \ln F + a_4 \ln S \quad (4)$$

$$\frac{\partial \ln Y}{\partial \ln F} = a_2 + a_3 \ln S + a_5 \ln F \quad (5)$$

These varying elasticities measure how much GDP would grow if S or F would increase by one percent.

Expression (3) was estimated by Ordinary Least Squares using cross sectional time series data for four Central American countries, corresponding to the 1971-1985 period.<sup>4</sup> The domestic savings data was constructed subtracting total consumption from GDP; the magnitude of the current account deficit was used as the variable representing the inflows of external resources, a common assumption in the literature.<sup>5</sup> All variables were expressed in millions of US dollars in 1980 prices. Dummy coefficients were introduced to denote the shifts in intercept and in the time variable corresponding to each country. The results are the following:

4. The sources of data are several issues of the publication *Estadísticas Macroeconómicas de Centroamérica* published by Secretaría Permanente del Tratado General de Integración Económica Centroamericana, Guatemala.

5. In every year, all countries experienced current account deficits, so all F variables were used with a positive sign.

**Table 1:** Estimation of Translog Function  $Y = f(S, F; t)$ 

Variables	Coefficients	T* statistics
Constant	10.6437	14.08
Ln S	-0.7218	3.50
Ln F	-0.0924	1.40
Ln S Ln F	0.0064	0.73
$(\text{LnS})^2$	0.0715	4.90
$(\text{LnF})^2$	0.0083	3.83
t	0.0267	4.11
D1 (El Salvador)	-0.4342	7.62
D2 (Guatemala)	-0.9443	9.59
D3 (Honduras)	-2.0730	17.96
T1 (El Salvador)	-0.0149	2.11
T2 (Guatemala)	0.0036	0.56
T3 (Honduras)	-0.0009	0.12
R2= 0.9975		F= 1408

It can be seen that the coefficient of determination ( $R^2$ ) and the F statistic of the equation are very high. Moreover, a F test was conducted to verify if the coefficient of  $\text{LnS LnF}$ ,  $(\text{LnS})^2$  and  $(\text{LnF})^2$  were all equal to zero. The calculated F statistic was 6.49, which indicates that these variables must be included in the model. Thus, the Cobb-Douglas model is not appropriate.

The economic growth elasticities were calculated with equations (4) and (5), using the mean values of LnS and LnF for each country. The results are presented in Table 2.

**Table 2:** GDP Growth Elasticities

Elasticities with respect to:	Costa Rica	El Salvador	Guatemala	Honduras
Domestic savings	0.4399	0.2614	0.3353	0.1816
External savings	0.0816	0.0409	0.0469	0.0383

The results indicate that for all countries the elasticities of GDP growth with respect to domestic savings are much larger than those with respect to external savings. This result is in congruence with the weak, or negative, effect of external savings on growth that has been reported by several studies.

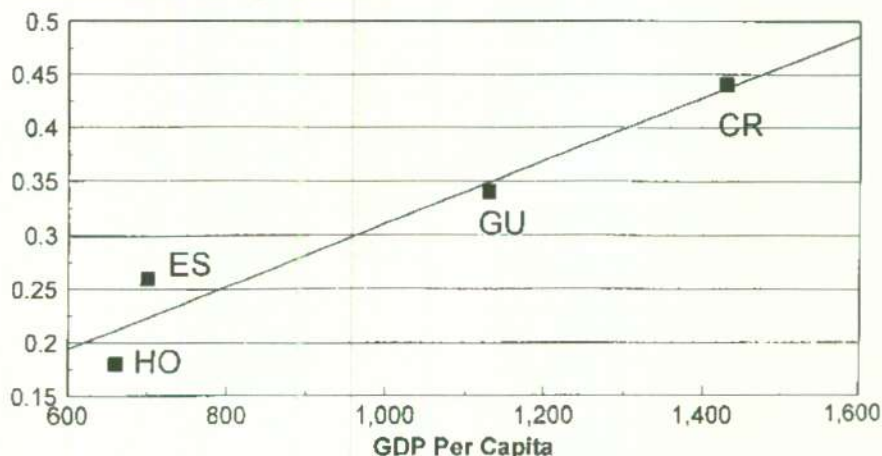
It should be noticed on Table 1 that the coefficient of time indicates that real GDP grows at a rate of 2.67% per year. This is the case in all countries except El Salvador, whose time

trend dummy variable is statistically significant and equal to 0.0149. In this country the secular trend of economic growth would be 1.18%. These secular trends are more than one half the average annual growth rate that each country experienced in that period. Thus technical change accounts for a large part of economic growth in Central America.

The results also indicate that there exists a correlation between the level of development, expressed as the 1982 value of GDP per capita, and the magnitude of the estimated elasticities, as can be seen in Graph 1.

GRAPH 1

GDP Domestic Savings Elasticity



Given that domestic savings may be considered to be endogenous, Two Stage Least Squares estimation was applied to equation (3), using  $F$ ,  $t$ , and exports as instrumental variables. The estimated coefficients turned out to be very close to those from the OLS estimation. The resulting elasticities are shown in Table 3.



**Table 3:** GDP Growth Elasticities (TSLS estimation)

Elasticity with respect to:	Costa Rica	El Salvador	Guatemala	Honduras
Domestic savings	0.4778	0.2795	0.3608	0.1910
External savings	0.0545	0.0229	0.0245	0.0183

All elasticities with respect to domestic savings are slightly larger than in the OLS case, while the external savings elasticities are smaller.

Another equation was estimated desegregating external savings into net official external debt disbursements,  $D$ , and net inflows of foreign investment,  $Z$ . The estimated equation is presented in Table 4.

**Table 4:** Estimation of Translog Function  $Y = f(S, D, Z; t)$ 

Variables	Coefficients	"t" statistics
Constant	9.4550	11.58
$\ln S$	-0.2799	1.01
$\ln D$	-0.0881	0.96
$\ln Z$	-0.0261	0.28
$\ln S \ln D$	0.0154	1.24
$\ln S \ln Z$	0.0107	0.53
$\ln D \ln Z$	-0.0085	1.32
$\ln(S)_2$	0.0325	1.30
$\ln(D)_2$	0.0015	0.58
$\ln(Z)_2$	-0.0024	0.52
$t$	0.0388	5.72
$D1$ (El Salvador)	-0.5928	9.29
$D2$ (Guatemala)	-1.2076	11.54
$D3$ (Honduras)	-2.3519	20.21
$t1$ (El Salvador)	-0.0242	3.35
$t2$ (Guatemala)	-0.0037	0.55
$t3$ (Honduras)	-0.0098	1.38
$R^2 = 0.9973$		$F = 887$

It can be seen that, in terms of  $R^2$ , the results are almost identical to the previous estimation. An F test was carried out to validate the translog formulation and the computed F value was 2.6, which indicated that at a 5% degree of significance the Cobb-Douglas specification was not valid.

This equation permits to compute the growth elasticities. These are shown in Table 5.

**Table 5:** GDP Growth Elasticities

Elasticity with respect to:	Costa Rica	El Salvador	Guatemala	Honduras
Domestic saving	0.4000	0.2629	0.3110	0.2305
External debt	0.0014	0.0015	-0.0023	-0.0011
Foreign investment	-0.0316	-0.0213	-0.0146	-0.0193

Domestic savings again show the largest elasticities, which are very close to the corresponding values presented in Table 2. Foreign investment shows negative elasticities in all countries, while external debt shows negative elasticities in Guatemala and Honduras. A pattern is again detected whereby the magnitudes of the elasticities increase with higher GDP per capita (see Graph 2).

Additionally, it can be observed in Table 4 that the coefficient of the time trend is very high, denoting a secular rate of economic growth of 3.88% per year, except in El Salvador where the time trend implies a growth rate of 1.46% per year.

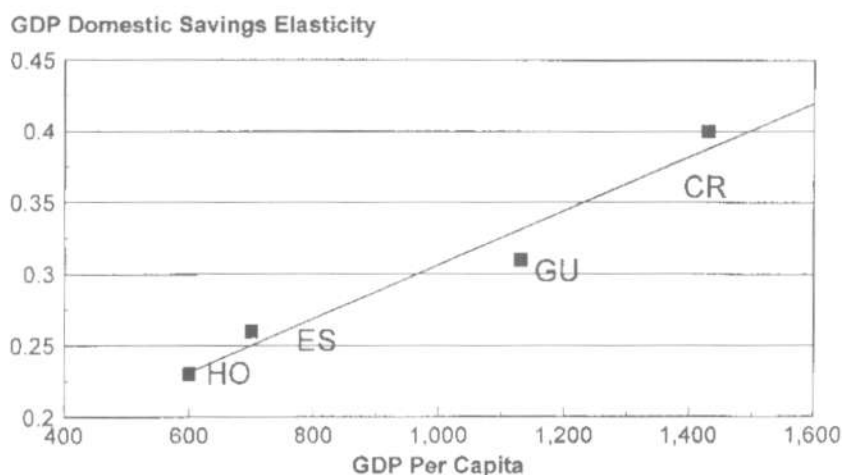
The low elasticity values of foreign resources are congruent with the empirical results found in the literature. This result would be consistent with theoretical models that show that external resources would promote growth depending on whether the interest rate charged on external debt is lower than the output capital ratio (Massell, 1964). Under the case that external resources depress domestic saving, which is a fact reported by numerous studies,<sup>6</sup> the conditions to be met by aid to promote growth are even more demanding (Wasow, 1979). Moreover, the fungibility of aid may be another reason why its impact on economic growth is small, as there is evidence that aid may lead to increases in consumption, and to decreases in tax revenues.<sup>7</sup>

6. See Cáceres (1992) and White (1992) for a review of these studies.

7. Pack and Rothenberg-Pack (1993) reported that: "The shift of funds away from development expenditures may account for the result in cross-country analysis that aid contributes little to GNP growth."



GRAPH 2



#### 4. Conclusions

The results presented in this paper have shown that the translog function is a valid representation of the economic growth function for the Central American countries. This would indicate that the elasticity of substitution is not constant and that there exists substitution or complementarity between domestic and external resources.

It was found that in all four countries domestic savings exert a much larger impact on economic growth than external savings. When this latter variable is disaggregated into two components, foreign investment shows a negative elasticity while the external debt elasticity is virtually zero. These results indicate that it is in the mobilization of domestic

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resources, financial, real, and human, where lies the key to Central American development.<sup>8</sup>

Topics for further research should be the quantification of the substitution or complementary elasticities between external and domestic resources, the extent of fungibility of different types of external resources, as well as investigating what variables explain the large magnitude of the time trend in the estimated equations.

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8. This has been the case in the "Asian Tigers", as Krugman (1994) puts it: "The newly industrializing countries of the Pacific Rim have received a reward for their extraordinary mobilization of resources that is no more than what the most boringly conventional economic theory would lead us to expect. If there is a secret to Asian growth, it is simply deferred gratification, the willingness to sacrifice current satisfaction for future gain... That's a hard answer to accept, especially for those American policy intellectuals who recoil from the dreary task of reducing deficits and raising the national savings rate. But economics is not a dismal science because the economists like it that way; it is because in the end we must submit to the tyranny not just of the numbers, but of the logic they express."

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**Abstract**

*This paper presents an analysis of the impact of external resources on Central American countries' economic growth in the 1971-1985 period. First, a review of the literature on external funds and economic growth in less developed countries is presented. This is followed by the formulation of a translog production model to the case of four Central American countries: Guatemala, El Salvador, Honduras and Costa Rica. This function expresses gross domestic product as a function of domestic and external savings and of a time trend. After the model is estimated, the growth elasticities with respect to domestic and external resources are calculated. The results indicate that technical change, represented by the time trend, is the main source of economic growth in these countries, that domestic savings have a perceptible impact on growth while external resources' impact is null or negative.*

**CAPITAUX ÉTRANGERS, ÉPARGNE INTÉRIEURE ET CROISSANCE ÉCONOMIQUE:  
LE CAS DE L'AMÉRIQUE CENTRALE****Résumé**

*Cette information présente une analyse de l'impact des ressources extérieures, sur la croissance économique des pays de l'Amérique Centrale dans la période 1971-1985. Premièrement, une revue de littérature sur les fonds externes et la croissance économique dans les pays moins développés est présentée. Cette revue est suivie par présentation du modèle "de production translog" pour quatre pays de l'Amérique Centrale: Guatemala, Salvador, Honduras et Costa Rica. Cette fonction exprime le produit intérieur brut comme une fonction de l'épargne intérieure et extérieure et du temps. Une fois le modèle estimé, les élasticités de la croissance par rapport aux ressources internes et externes sont calculées. Les résultats indiquent que le progrès technique, représenté par le facteur temps, est la principale source de la croissance économique dans ces pays, et que l'épargne intérieure a un impact important sur la croissance, tandis que celui des ressources extérieures est nul ou négatif.*